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OPYT SODERZHANIYA KALANOV V NEVOLE
RAISING SEA OTTERS IN CAPTIVITY

By T.A. Mal'kovich

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The Enhydra lutris L., otherwise known as sea beaver, Kamchatka beaver, and sea otter, was discovered in 1741 on Komandorskie Islands, the first scientific description being given by G. Steller (see /1/). At that time, large numbers of sea otters populated the island coasts of the Bering Sea, Aleutian Islands, Kuril Islands, Sakhalin, Hokkaido, Kamchatka Peninsula, Alaska, and the west coast of North America down to California. Later, as a result of depredation, the sea otter herd began do diminish catastrophically. By the 1920's, the sea otters were exterminated practically everywhere. In our country, on Komandorskie Islands, there remained only one herd of 200 to 250 animals.

The importance of the sea otter - an animal yielding a valuable pelt - to national economy - is indisputable. It is quite understandable, then, that one of the first measures adopted by the Soviet power, which became established in Komandorskie Islands in 1924, was the introduction of its strict protection. However, in spite of the fact that hunting was discontinued, the numbers of sea otters increased very slowly.

The ignorance of the biology of this mammal hindered the adoption of measures favoring the restoration of the herds. Therefore, after the general biological studies of these animals under natural conditions conducted by I.I. Barabash-Nikiforov /2/, we experimented with keeping sea otters in captivity on Mednyi Island in 1934-1936. We were able to throw a light on a number of important details pertaining to the biology of sea otter, the possibility of keeping these animals in captivity and

getting them to mate, developing a methodology of feeding and raising the young, and long-distance transportation of animals for the purpose of their acclimatization and reacclimatization /3-5/.

True, many important questions pertaining to the biology of this mammal remained unanswered, for instance the gestation period, the time of sexual maturity of the female and the male, the number of females serviced by one male, the rational method of hunting, etc. Nevertheless, our three years of experience of keeping sea otters in captivity will undoubtedly be of assistance in further studies of the biology of these animals.

Capturing the sea otters

During the winter, in stormy or near-stormy weather, the sea otters at the Mednyi Island usually come closer to shore, hiding from the wind behind rocks, crossing over to the lee side of the cape or the extremities of the island and, exhausted, climb the rocks known as Bobrovye Stolby. This is the best place for catching sea otters. In this weather, the roar of the surf deafens the noise that is unavoidable in the process of the capture. However, taking into consideration the difficulty of getting food for the otters during the winter, we decided to catch them in summer. Tracking the animals in early August, we engaged in action only on the 21st, because we had to wait for suitable weather and a wind that would blow from the sea toward the land.

Special nets were made for capturing sea otters. A two-meter-deep net made of delhi fiber with a mesh 20 cm in perimeter and a light pole, 2 - 2.5 m long, were fastened to a hoop 80 - 100 cm in diameter, made from a wire 0.8 cm in diameter. /127

We left on our hunting trip in a six-oar boat. We reached the Bobrovye Stolby rocks at 7:40 A.M. The hunters were dévided in two groups (three men per net): one group was circling the rocks on the south side, the other on the north side. At the leader's signal, the hunters lay down and crawled toward the sea otters across thick slippery seaweeds. The nets were handled by the best hunters. The leader, S.K. Ladygin, moved ahead. In order to ap-

proach the sea otter without being noticed and cut off its escape route to the water, he had to wade in water up to his waist. The animal became aware of the danger too late and headed toward the water, but the net was already on its head. As soon as the sea otter was in the net, the cord strung along the edge of the net was pulled tight and the animal finished being tied up in a sack. A second sea otter was captured in the same manner. A couple of sticks were pushed through the tops of the nets and the animals were carried to the boat and placed in transport boxes. The entire operation lasted 50 minutes. Both animals were males. During subsequent hunting expeditions on land in the same places only males were caught in the nets.

According to S. Lekh /6/, the sea otters caught with sticks ("drygalka" in the local dialect) at Bobrovye Stolby of the Mednyi island included 91-93% of males, and only 7-9% of females.

Females were basically captured with nets set in the water, since they rarely come on shore. The nets were made of fine tow 2-3 mm in diameter, with a mesh perimeter of 48 cm. The size of the net was 25x4 m.

Starting in the second half of 1936, hunting with nets began to be used in gathering places of females. It was done as follows: a net was set near the rocks on which the females rested at night. Diving from the rocks, they would get their heads into a mesh of the net, become entangled and rise to the surface. At this moment, the sea otter must be immediately lifted with the net to the boat, because otherwise it may choke.

The capture of sea otters in the area of the Urup island during the summer of 1956 showed that a two-oar boat can be used to catch young animals. There are reasons to assume that adult sea otters could be captured with a net in the water by chasing them on a motor boat.

The keeping of sea otters

I have studied the biology and ecology of the sea otter on the Mednyi island for three years, except the problems of transportation.

The test was conducted with two groups of sea otters. The first group was kept under conditions close to the natural, the second group

was housed far from the sea in a small sweet-water basin. Both groups received the same food closely duplicating the natural food of the sea otter: sea urchins, shellfish, and sea fish. We tried out as food the flesh of sea animals and cow's milk. All changes in the conditions of keeping and feeding during the experiments were made gradually.

Design of the open-air cage. I.I. Barabash-Nikiforov /2,7/ explained the death of the sea otters captured by him mainly by the inadequate housing in which the test animals were placed. We took the observations of I.I. Barabash-Nikiforov into account before starting our experiments with sea otters.

First of all, we tried to keep the animals under conditions that /128
were close to the natural. It is known that sea otters feed exclusively in the water, but rest in the water, as well as on land. With this in mind, the enclosure had been built in such a way that one part of it was on land and the other in the water. The outdoor part of its left and right corners was filled with rocks on which the animals could lie. The remaining surface of the enclosure was covered with a layer of sand. Moreover, a wooden platform with a gangplank to the water was erected above the heap of rocks in the left corner. Later, the enclosure was partitioned lengthwise by wire netting to separate the males from the females.

The enclosure had been emplaced at the estuary of Lake Gladkovskoe on Mednyi Island, whose water is slightly desalinated in comparison with sea water. This lake has large populations of sea fish and shellfish on which the sea otters feed. Nearby at the Gladkovskaya Bay, some 300-400 m from the location of the enclosure, there was an abundance of sea urchins.

I.I. Barabash-Nikiforov /2/ noted that sea otters had strong teeth and paws. A sea otter can climb a vertical net, gnaw wood, tear apart live fish, sea urchins and shellfish. Taking this into account, we made the frame of the cage from bar iron 75 mm in width and 7 mm thick, with iron rods 10 mm in diameter being inserted in individual links. But the sea otters proved to be comparatively peaceful. They never tried to crawl out of the enclosure or to tear the netting. The following year, there-

fore, for keeping sea otters in sweet water, we made a cheap cage from used fox netting and some old lumber. The open-top cage measured 130 cm. A 2 x 2 m pit, 1 m in depth, was dug out on a mountain slope through which a stream was flowing, and this simple cage was installed above it (Fig. 1).

Observation hut. To create a quiet atmosphere for the animal, we observed its behavior from an observation hut. There was a door in the back wall of the hut and a window in the front one. The upper windowpanes offered a view of Lake Gladkovskoe, while, while the interior of the cage could be observed through the lower ones. The hut was equipped with the bare necessities: a scale, a lantern, a lamp, etc., while outside the hut we had a container for garbage and feed leftovers, a shovel and a spear for harpooning flounder in the lake.

The behavior of sea otters in captivity

Released in the enclosure, single healthy animals behaved differently: some would enter the water immediately and hide in the far corner, others would climb out on land, walking along the cage walls and trying to undermine them. At first, the sea otters would lose appetite and suffer from insomnia.

In company, the animals felt better: they would eat, sleep, and play together.

We observed a difference in behavior and temperament of partly domesticated and wild animals. Thus, Novichok* was placed in the cage occupied by the domesticated Krasnonsyi. This company had a beneficial effect on the domestication of Novichok. He stopped to fear people, began to swim more boldly near the shore, climb out on land and even take away the /129

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* The names of the sea otters in the order of their capture were: Krasnonsyi, Novichok, Bol'noi, Mai - a young male, Malysh - a one-year-old male, Mechta - a sick female, Leva - an adult male, Iskra - an adult female, Maya - daughter of Iskra, Yulya - a young female caught without mother, and No. 1 - hurt during capture.

food from Krasnonosyi left for the latter on the s[illegible]

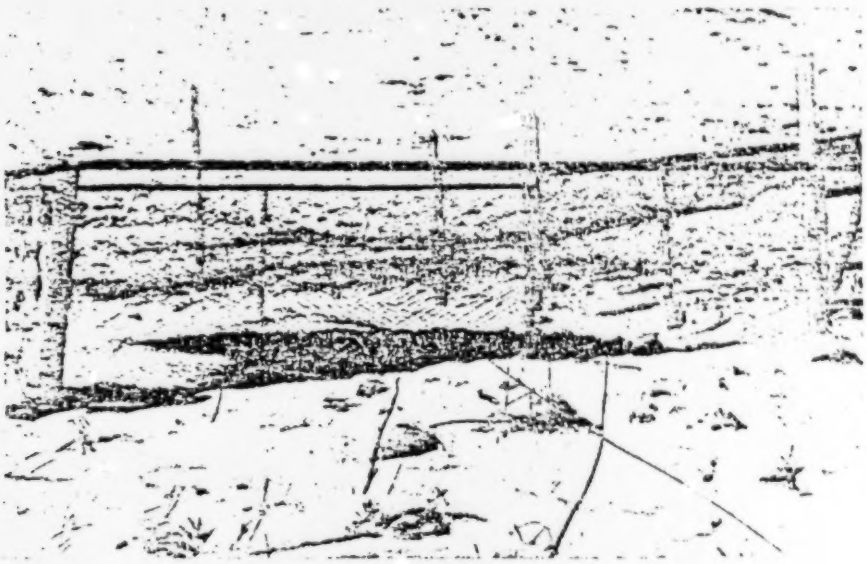

Fig. 1. A cage enclosing a sweet-water basin with a stream running through it.

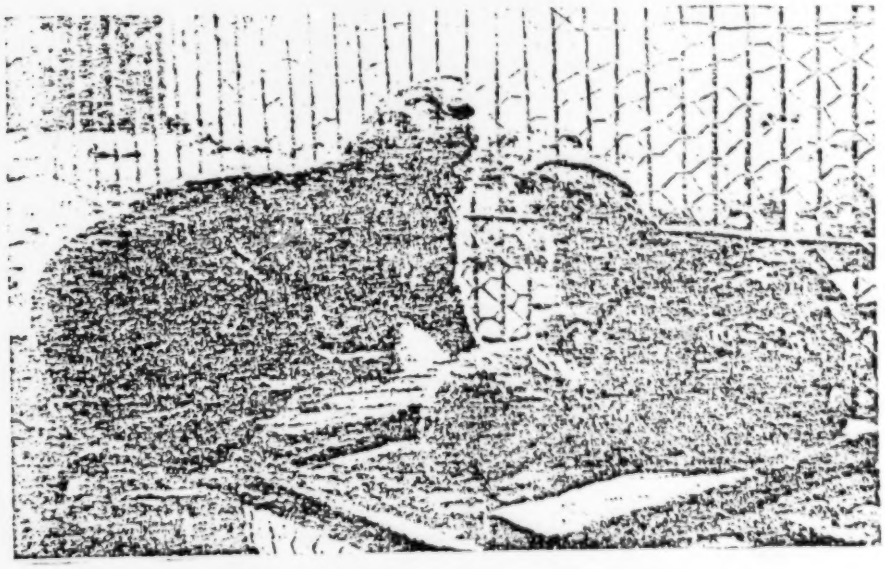

Fig. 2. A group of sea otters: on the left - a male, on the right - a female; between them, a young sea otter sheltered by its mother's flipper-shaped hind extremity.

A male in isolation preferred to rest in the sandy area on land, to a lesser degree on the rocky ground and, least of all, on the wooden platform. However, as soon as a female joined him, he would without exception lie down near her on the wooden gangplank (Fig. 2).

In the morning, during the day, and in the evening, the animals would come on land, rest, and then enter the water again. Their morning and evening stay in the water was of shorter duration, whereas during the day the sea otters would remain in the water 7-8 hours. /130

The sea otters fed usually in the water. Consuming their food they would turn in the water washing off the crumbs that were sticking to their coat. After the meal, the animals would clean themselves and play for a long time, somersaulting, splashing and foaming the water around them.

External stimuli - light from the lamp, strange odors, appearance of other animals - provoked but a weak reaction from the sea otters. Lamp light did not frighten them, the smell of kerosene, even at a distance of 8-10 m, did not have any noticeable effect on them. Polar foxes and calves walking around the enclosure did not produce any reaction from the sea otters.

Numerous examples of purposeful and rapid actions on the part of the sea otters permit us to classify them as animals possessing a highly developed nervous activity. Here is an example of an attempt to catch the female Maya with a net. After noticing the net, she would dive and hide. The net was suspended above the platform in the shape of a bell at an altitude of 20 cm, pieces of cod, serving as a lure, were placed under the net in such a fashion that, when picking up the last ones, Maya's entire body would be under the net. Maya tried to circle the net on the other side and to pick up the bait with her paw from above through the net mesh. But since there was no meat on that side, the female had to approach from the front and crawl to the platform. Picking up the meat piece by piece, Maya looked around all the time, closely watching all my movements.

Sea otters sleep in the water always on their back, stretched out or turning their flipper-shaped hind extremities toward their body. On land they sleep in different postures: on a sunny day - stretching out

on their backs, on a cold rainy day - curled up on their side. The profoundness of the sleep depends on the degree of domestication, satiety, location, state of health, etc.

The feeding of sea otters

The fact that the cage was erected at Gladkovskee Lake permitted us to duplicate the water conditions and the diet the sea otters enjoy in their natural habitat. Sea water enters the lake and with it come the different fishes that the sea otters fed on: Pacific cod (Gadus morhua macrocephalus Tillesius), whitebelly rock sole (Lepidopsetta bilineata Ayres), starry flounder (Pleuronectes stellatus Pallas),* masked greenling (Hexagrammes octogrammus Pallas), rock greenling (Hexagrammos supercillosus Pallas), pink salmon (Oncorinchus gorbuscha Walb.), coho salmon (Oncorinchus kisutch Walb.), Pacific stone-leach (Salvelinus malma Walb.), sea scorpions or antlered sculpins - monkey goby and fringed sculpins (Crossias albemaculatus Schmidt), Bering fringed sculpins (Crossias beringi Soldatov) and bivalve molluscs. However, the animals in the enclosure ate well also the feeds not present in the lake and obtained from the sea: lumpfish (Cyclopterichtis ventricosus Pall.), octopus (Polipus sp.), sea urchins (Strongylocentrotus drobachiensis Mlle).

Observations have shown that sea otters need a variety of foods. The uniformity of the feed ration caused the animals to lose their appetite. Thus, although cod was preferred by the sea otters (it amounted to 66.6% of their ration), the animals would vomit if they received nothing but cod. The sea otters would not eat it in spite of obvious starvation. At the same time, they willingly ate other species of fish of the same degree of freshness. /131

The tests have shown that the sea otters' daily ration, together with cod, must include fish of other species in the amount of 1/3 - 1/4

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* Starry flounder was fed to the sea otters only after removal of the skin.

of the fish ration, as well as sea urchins which should make up 1/5 to 1/6 part of the ration. One adult sea otter was given a daily amount of 23 kg of fresh raw feed: fish - 57% and sea urchins - 43%.

When feeding, the animals would discard the heads of fish, the entrails, the skin with the fins and the bones, as well as a considerable part of the sea urchins' shell. But not all the food consumed was assimilated by the sea otters. Sea urchin shells and cockle-shells swallowed by the sea otters were not digested, simply passing through and out of the digestive tract. It could be that the indigestible parts of food functioned as a ballast or, perhaps, they contained vitamins. The daily requirements of pure fish flesh for sea otters of various age groups are shown in Table I.*

Table I

Group designation	Approximate age	Live weight kg	Consumed in a 24-hour period			
			g	large calories	Per 1 kg of live weight in grams	in large calories
Adult male	7 years	31	4928	3351	159.0	108.1
Adult male	5 years	42	5759	3916	137.1	93.2
Breeding sires before mating	-	32.5	7700	4896	233.8	150.7
Female in heat	5 years	27.6	7580	4824	274.3	174.4
Male during mating period	5 years	37.3	10580	6851	283.6	183.6
Young animals:						
Maya	4 months	10.1	3830	2619	372.2	259.3
Maya	5.5 mon.	14.3	4490	3073	313.9	214.9
Malysh	12 mon.	17.5	5200	3400	297.1	193.1

* The calorie value was determined from the tables of G.V. Derbenev and P.A. Petryaev /9/. The computation of the calorie value of feeds consumed by sea otters has only a relative significance and is used just for comparisen of feed consumption by various groups of animals, and also for comparisen of food consumption by sea otters in Mednoe Lake and the coast of Murmansk.

Thus, it appears from Table I that:

a) the larger the live weight of an adult sea otter, the more food it needs to sustain its vital functions. But the amount of heat energy required per 1 kg of live weight of a larger sea otter proves to be smaller;

b) an adult male during the period of sexual excitement and mating consumes 74% more food than usual. Moreover, more food is expended per 1 kg of live weight of a male than per 1 kg of weight of a female, even if her overall weight is smaller;

c) young animals (one-year-old male Malysh), having a smaller live weight, consumed relatively more food than the adult sea otters.

Such an unequal consumption of food by animals of different live weight and age is explained not only by the fact that a smaller animal has a relatively higher heat emission per unit of surface and, therefore, requires more food per unit of live weight, but also by the higher amount of energy of tissue regeneration in a young organism than in an older organism.

The weighing of sea otters showed that they lose weight during the initial period of captivity: during the first month of their stay in the cage, Iskra lost 0.2 kg, Leva - 2.2 kg, and Yulya - 0.3 kg. In the subsequent period of captivity, the sea otters gained weight: Iskra - 1.2 kg, Leva - 0.4 kg, and Yulya - 2.4 kg.

The breeding of sea otters /132

The prerequisites for mating during the summer season of 1936 were the following: a) normal behavior and average fatness of the animals in the enclosure; b) erection observed in the males in the enclosure during all the months of the year; c) birth of the young in nature during the entire year.

An attempt to induce the female to mate in presence of her young ended in failure. The female and her offspring had to be separated.

The separation was traumatic for the mother and the young during the first day. Subsequently, however, the female became more accessible with regard to the male, as the latter became more persistent. Nevertheless, mating occurred only twelve days after the separation from the

young, that is only after the female stopped resisting.

When both animals were willing to mate, a foreplay preceded. During this period, the animals were peaceable and tended to stay together. The coitus would begin and be completed without violence or injuries. Coitus would be initiated sometimes by the male, and sometimes by the female. The external signs of sexual emotions in sea otters are the calling sounds they make, the sniffing by the male of the female's vulva and coat, the mutual touching by the snout and teeth of the partner's helices, head and neck, mutual embracing, and the emission of particular grumbling sounds. During the mating period, the sea otters ate more sea urchins and molluscs and less fish.

Sexual activity, as a rule, was especially intense during the first half of the day. Coitus was repeated more frequently on the first day than on the following day and also it lasted longer in the first half of the day than in the second half. Mating took place in the water exclusively. During mating the female lies with its back on the male's belly.

After mating, the female would often rest on the plank above the water, and the male usually would eat; the female either would not eat at all or would consume a few sea urchins and molluscs. Three day after the first coitus, attempts by the male to repeat it were warded off by the female. Obviously, by that time she was already pregnant.

The sexual capacity and energy of the male, according to our observations, greatly exceeded the needs of one female. The attempts of the male Leva to mate an adult female and, after it, also an adolescent one, show that the male lacks a capacity for selection, and permit one to assume that, in nature, sea otters are not monogamous. Definitive information on the sea otter's polygamy would permit us to consider regulating the numbers of the two sexual groups.

Raising the young

Juvenile sea otters would quickly get used to a given diet. The young nursed 6-7 times a day, from 5:00 A.M. to 9:00 P.M., each feeding lasting from 3 to 26 minutes. But soon after whelping the female would begin to feed her offspring some sea urchin eggs, a fillet of fish or some shellfish.

The maximum quantity of food eaten by a two-week-old animal was 1135 g. The juvenile otters favored above all sea urchin eggs, then the milt and liver of fish, as well as molluscs. The additional daily ration of the two-month-old female Maya, captured together with her mother, amounted to 1145 g, and to 1653 g at the age of two and half months. At the age of four months, a young animal (without mother's milk) would receive 3530 g of food, and 4090 g at the age of five and half months.

As a result, the juvenile sea otters gained weight: when fed /133
by the mother and nursed - an average of 109 g per day, at the age of three months - 136 g. The gain of weight at the age of five months, when the animals were feeding alone without thier mother, amounted to 160 g for Maya and 44 g for Yulya. Five and six-month-old sea otters had a higher daily food consumption by 560 g on the average.

Juvenile animals reacted strongly to any disruption of the established feeding schedule. If no food was supplied at the usual time, the young would begin to search for leftovers of yesterday's feeding, swim, dive and squeak.

One of the sea otters, the male Malysh, ate with gusto the flesh of northern sea lion (Eumitopias jubatus Schr.) and plucked bird carcasses: harlequin ducks (Histrionicus histrionicus pacificus Brooks), Komandorskiye's ptarmigans (Lagopus mutus ridgwagi Steiniger). And what is more, the animal in question preferred the flesh of sea lion and birds to fish, which is explained, of course, by the small amount of that food offered to the animal. As B.T. Fedorev and O.N. Danilev point out /8/, sea otters willingly ate the flesh of warm-blooded animals (reindeer). We have observed a nursing female raising somebody else's young. These observations have been confirmed by B.T. Fedorov and O.N. Danilov /8/.

Our experience warrants the following conclusions with regard to the domestication of young animals: 1) young sea otters may be raised in captivity with their mother and, as soon as they reach the age of three months, also without their mother; 2) the young raised with their mother gain weight faster than those raised without their mother. One month after her capture, Maya doubled her weight, and at the end of the

second month her live weight was 3.5 times larger (3kg as compared to 10.5 kg); 3) orphaned juvenile otters can be raised by a nursing female.

Release of domesticated sea otters

Sea otters are capable of adjusting quickly to life in the enclosure. Everything depends on conditions of domestication, individual characteristics, the animal's age, etc. Single animals are domesticated faster, the young ones sooner than the old ones.

A juvenile sea otter captured and kept in the cage with its mother developed, under the latter's influence, a fear of humans, grew unsociable, and its domestication was retarded. But as soon as the young were separated from the adult animals, their behavior changed completely.

Experiments have shown that nursing sea otters one to two weeks old kept without their mother became used to humans immediately after their capture. The juvenile May was reluctant to be separated from a human already on the first day after being captured.

The appearance of a human in the enclosure was now associated by the young otters with feeding reflexes. The juveniles squeaked, swam closer to the shore, stretched out their paws toward the human.

When kept half-starving, the animals became restless, entered the water more frequently, returned to the land and approached the observer less reluctantly.

In order to establish the degree of domestication, we set free the male Krasnonosyi in 1934 and the juvenile Maya in 1936. The male stayed at liberty 17 days and often spent the night near the enclosure. The female stayed at liberty 14 days. She returned to the enclosure every day and received food from us and from her mother.

The behavior of Krasnonosyi was different than that of Maya also at liberty. The domesticated Krasnonosyi was more reluctant to enter the enclosure than the less domesticated female Maya, which rushed to get in. We explain it by the fact that during the three months that /134
the animals stayed together in the enclosure the male Krasnonosyi

was persecuted by Novichek, whereas Maya was there in the company of her mother.

Acclimatization of sea otters

The research done on Mednyi island on keeping sea otters in captivity was a preparation for the transportation of animals to other places.

The preliminary studies of the Murmansk coast conducted by me in May, 1937 /11/ and then by I.I. Barabash-Nikiforov /7/ showed that a large part of this coast is suitable for acclimatization of sea otters: the climate there is almost the same as on Mednyi island, the structure of the shores is similar and the food is identical.

The sea otters were transported 14000 kilometers from Komandorskie islands to Vladivostok by freighter and from Vladivostok to Murmansk in a live-fish railroad car coupled to the head of an express train.

Aboard the ship the sea otters were placed in spacious cages made of a wooden frame 2 x 2 x 1.8 m covered with a wire netting. Each cage was equipped with a wooden basin measuring 2 x 1 x 0.7 m. The basins were filled with water by means of a pump. To assure quick drainage, there was at one corner of the basin bottom a square hole 10 x 10 cm with a wooden plug the handle of which protruded above the water surface.

The sea otters were loaded on the freighter on October 23, two to each cage. Out of nine animals there were five males and four females, including one with a month-old young.

In Petropavlovsk-na-Kamchatke the sea otters were transferred to a ship laving for Vladivostok. The weather during transportation was rainy with wet flurries and the sea otters caught a cold: five of them died in Petropavlovsk. An autopsy showed pneumonia. To prevent the other sea otters from catching a cold, the sides of the cages were covered with cloth and the water in the basins was left just for short periods. On the trip to Vladivostok two more animals died. From the

remaining three sea otters, the female was in a serious condition and only the two males were relatively healthy.

Subsequently, the animals were loaded onto a live-fish railroad car in a basin containing sweet water and shipped to Khabarovsk. The car was equipped with a wooden platform on which the sea otters could rest. To ease off the jolting, springed mattresses were laid on the platform. At the Vladivostok-Khabarovsk stage, the last female died.

On December 1st, 1937, two males were delivered to Murmansk. They were then transported by cutter and placed in an enclosure at Yarnyshnaya bay on the east coast of Barents Sea.

The well-known sea otter specialist, I.I. Barabash-Nikiforov, had the following comment on this occasion: "The delivery to the Murman of two live Komanderskie sea otters is an undoubtful proof that the transportation of these animals at such enormous distances is possible. One cannot fail recognizing the great significance of the described first experiment, the particulars of which will help develop better methods for future transportation of these animals." /7/.

The sea otters in question lived at the Murmansk coast, at Yarnyshnaya bay, for four years /12/, and one of them, which had been released, lived for six and half years - till 1944. This has proved that the acclimatization of sea otters in that area is possible.

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Parallel to the research on the acclimatization of sea otters conducted at the Murmansk coast, the Arctic Institute of the Main Administration of Northern Seaway established a scientific research station in Komanderskie islands in 1936. The reports of the work at this station published by its director, E.D. Il'ina /10/, confirmed the correctness of the methodology developed by us for feeding sea otters, their capture in the water with nets, as well as our observations on mating.

B.T. Fedorov and O.N. Danilov /8/, scientists at the All-Union Research Laboratory of Wild Animal and Reindeer Husbandry, who worked

on Komandorskie islands, observed a nursing female raise an orphaned baby sea otter; this observation confirms our experience of a lactating female raising a young that is not hers. These researchers also confirmed our finding that sea otters do it the flesh of warm-blooded animals and that they can be fed minced fish with bones, a fact that permits a higher percentage of fish to be used in their diet.

American scientists R. Belin /14/ and E. Fisher /15, 16/ studied the sea otter herd of southern California under natural conditions. Studies of the northern herd at Amchitka Island located in the Aleutian chain were conducted by O. Moore and U. Williams /17/, scientists at the Washington biological station. They studied the food of sea otters in 1938-1939 by examining their excrements. These scientists arrived at the conclusion that sea urchins (Strongylocentridae) make up 75-78% of a sea otter's food, while the share of fish is almost nil (0.99-3%). However, our findings indicate that the share of fish in the sea otter's ration amounts to 80%, whereas the share of invertebrates is a mere 20%. This contradiction is explained by the fact that, when eating sea urchins, the sea otters swallow a considerable part of the shell, which is not digested and makes up the principal residue of the feces. When eating fish, the sea otters discard the head, bones, entrails and skin, and consume only the fillet. Therefore, the feces of sea otters contain only fish bones swallowed by accident.

From 1949 on, attempts had been made in the USA to capture sea otters on Amchitka Island and settle them in other places. Animals were captured during five or six winter seasons, but they died a few hours or days after capture. The dying sea otters were observed and autopsies performed by R. Jones /18-20/, who concluded that nervous shock was the reason for death. But the observations we made on Komanderskie islands indicated that death resulted from choking, swallowing the wrong way, starvation, inadequate conditions of keeping, etc.

Out of 22 sea otters captured at Amchitka in 1954 only three survived. Two months after capture, these animals were transported on deck of a motor boat to Seattle and placed in that city's zoo, where they remained for two weeks. According to Ford Wilke (see /21/), the sea otters were

in perfect health at that place. On June 14, 1954, they were transperted by plane to the state zoelegical garden of Washington, where they soon died. The reason for death was not established, because there was no biologist at the zoo. Kirkpatrick, Stulken, and Jones /21/ assume that this death was caused by the extremely high air temperature.

The fact that some sea otters were transported by air opens the possibility of using this mode of transpertaion of these animals at considerable distances in a short time.

Thus, in the past twenty years (after the conclusion of our experiment) there has been barely any work done on the biology of the sea /136
otter either in captivity or under natural conditions. Meanwhile, studies in this area have an undoubtful significance for our national economy and are of scientific interest as well.

Using the information gathered so far, the Sakhalin Complex Scientific Research Institute of the Academy of Sciences of the USSR is concentrating its research now on the problems of reacclimatization of sea otters, on determining their period of gestation, the reaching of sexual maturity, the limits of growth, the number of females serviced by one male, the possible polygamy among these animals, the obtaining of more frequent parturitions, the determination of fertility and of the time elapsing between two successive deliveries, as well as on a number of other questions.

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